

# QPE Analysis: MPE-RFC Comparison

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# Background

- NWS has a number of operational products for quantitative precipitation estimation (QPE)
- Products have different resolution (temporal and spatial) and use different sensor information to derive QPE
- Verification of QPE products is difficult, especially in mountainous regions
- HMT precipitation data is currently not used in operational QPE products and can serve as independent validation

# Objective

- ◆ Use HMT-West data to assess 2 QPE products: MPE and RFC
  - Which product does a better job at QPE in different precipitation regimes and different regions?
  - Quantify uncertainty in MPE for FFMP
  - What is added value of gap-fill radar data to MPE product?

# QPE Products Evaluated

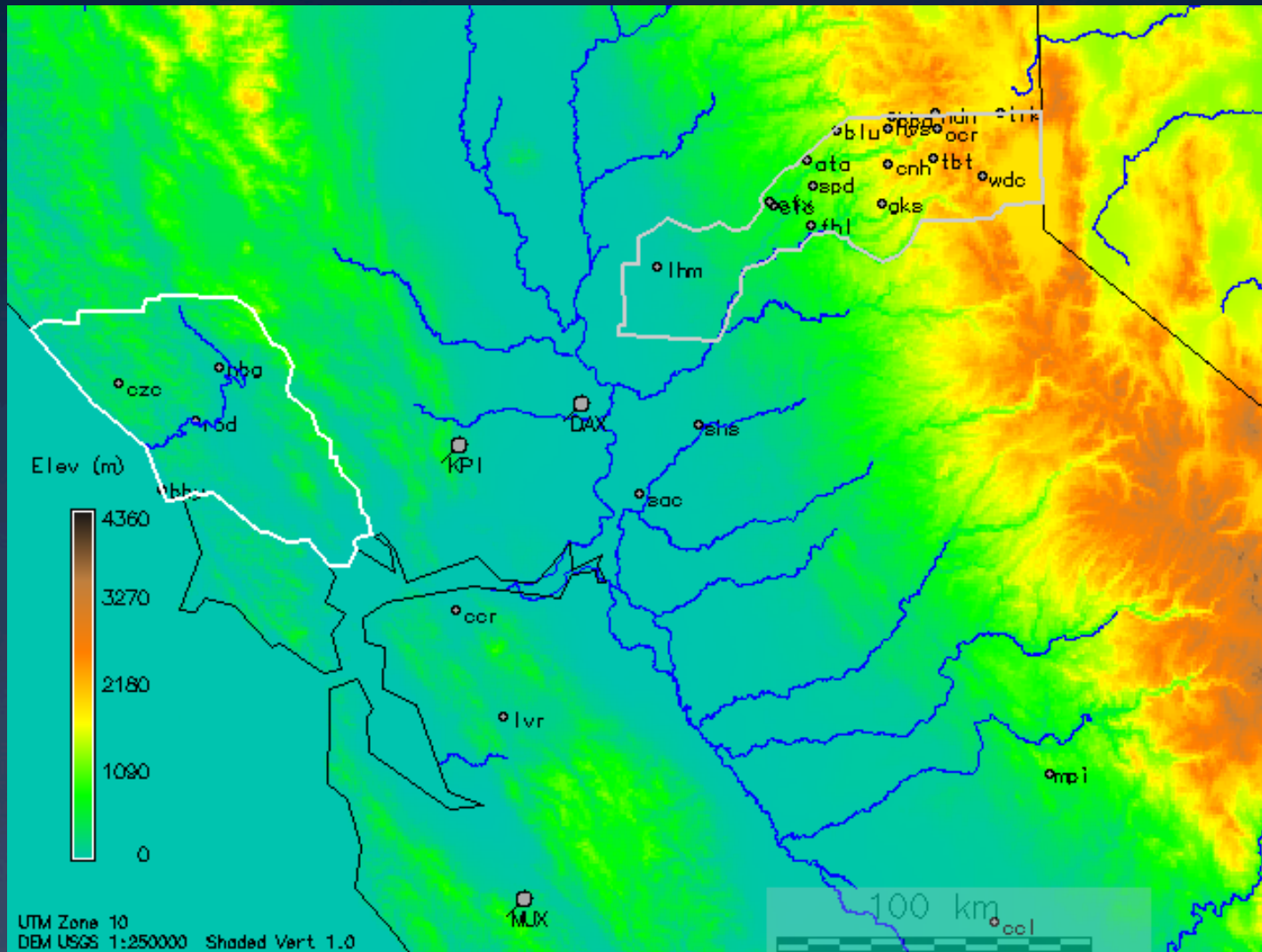
## ◆ Multi-sensor precipitation estimator (MPE)

- Uses combination of radar and rain gauge data to construct QPE on 1 hr time scales
- Data are interpolated to 4 km grid
- Gauge data used to bias-correct radar data

## ◆ RFC (River Forecast Center) Stage IV

- Uses gauge data only to construct QPE
- Data are interpolated to 4 km grid
- PRISM climatology used interpolate data
- Temporal resolution is 6-hr

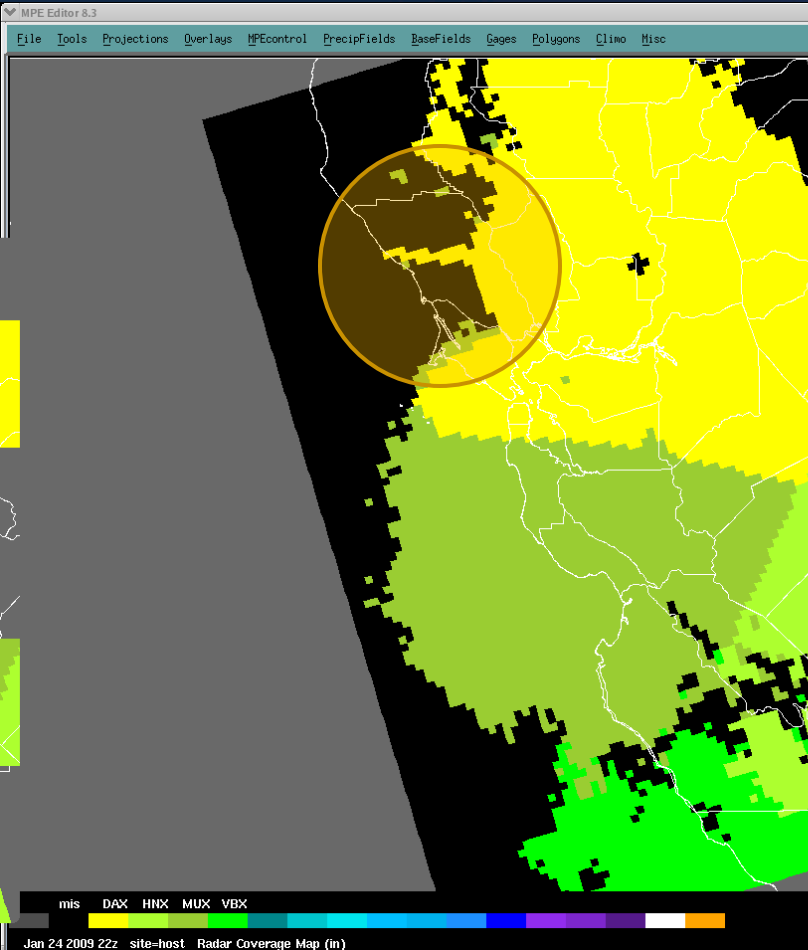
# HMT Gages, MTR MPE Radars



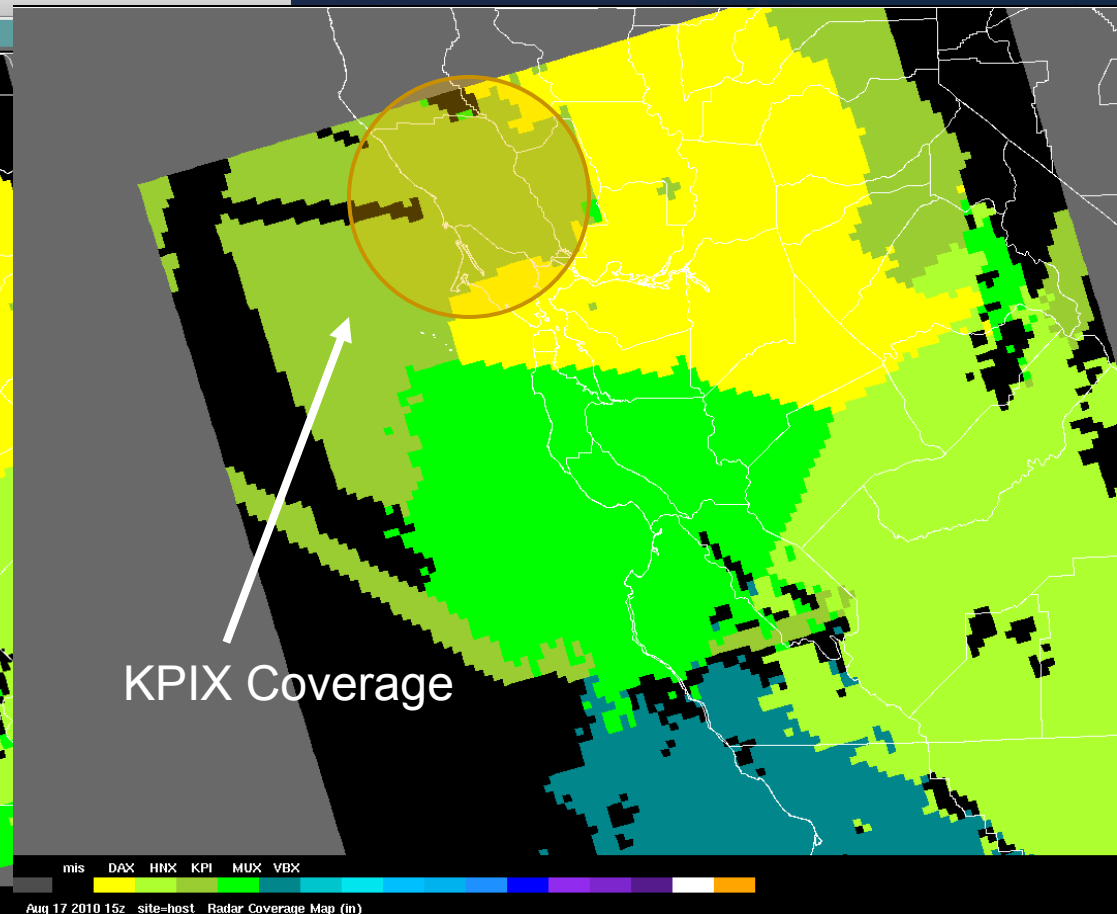
# Radar Coverage

## MPE – Multisensor Precipitation Estimator

### NEXRAD Only



### NEXRAD +KPIX



KPIX could have significant impact to MPE in Sonoma County



# Analysis Plan

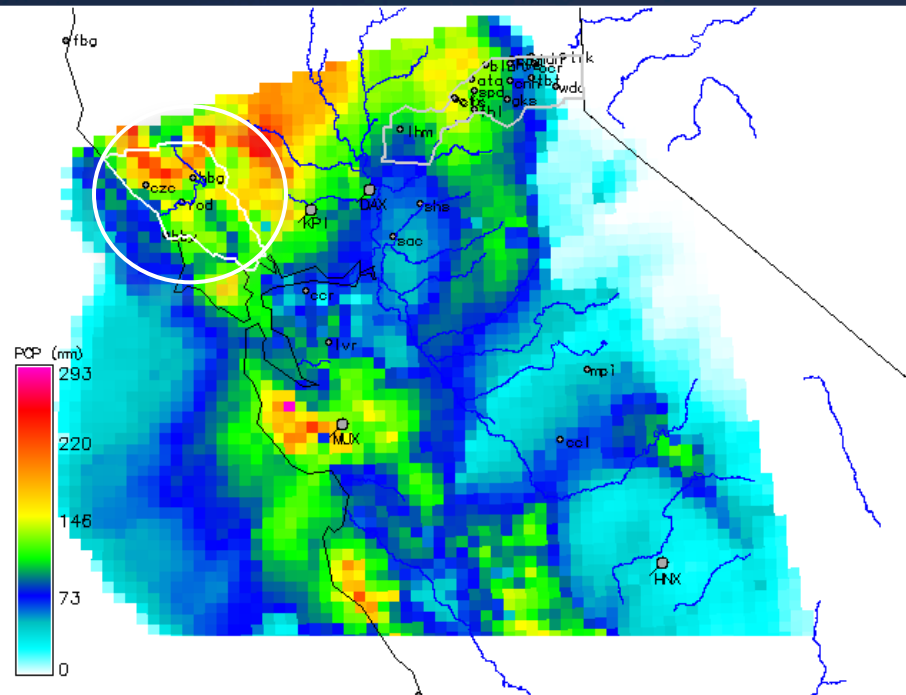
- Examine a “test case” (no KPIX) to develop methodology
- Contrast results with another test case (with KPIX)
- Examine multiple seasons of data to develop robust statistics

## Expected Outcomes

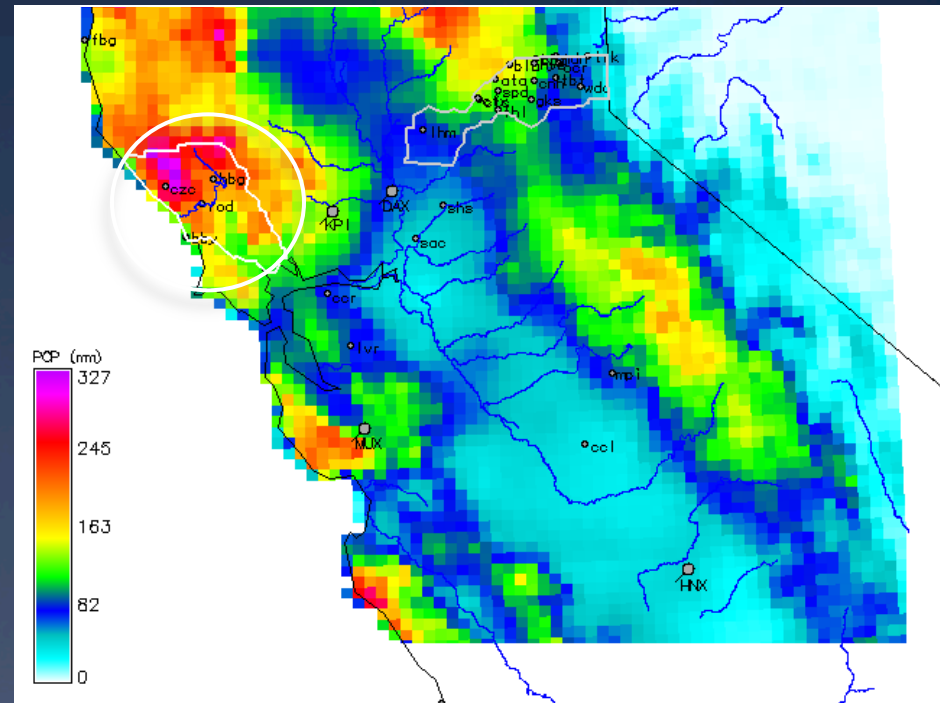
- Improved understanding of uncertainty in MPE and RFC QPE products
- Quantify improvement of MPE using KPIX
- Evaluation of additional QPE products (e.g., Q2)
- Evaluation of short-term QPF products

Case 1 Storm Total: 01/17/10-12z to 01/21/10-18Z  
RFC Stage 4 QPE vs MTR MPE QPE

## MTR MPE Storm Total

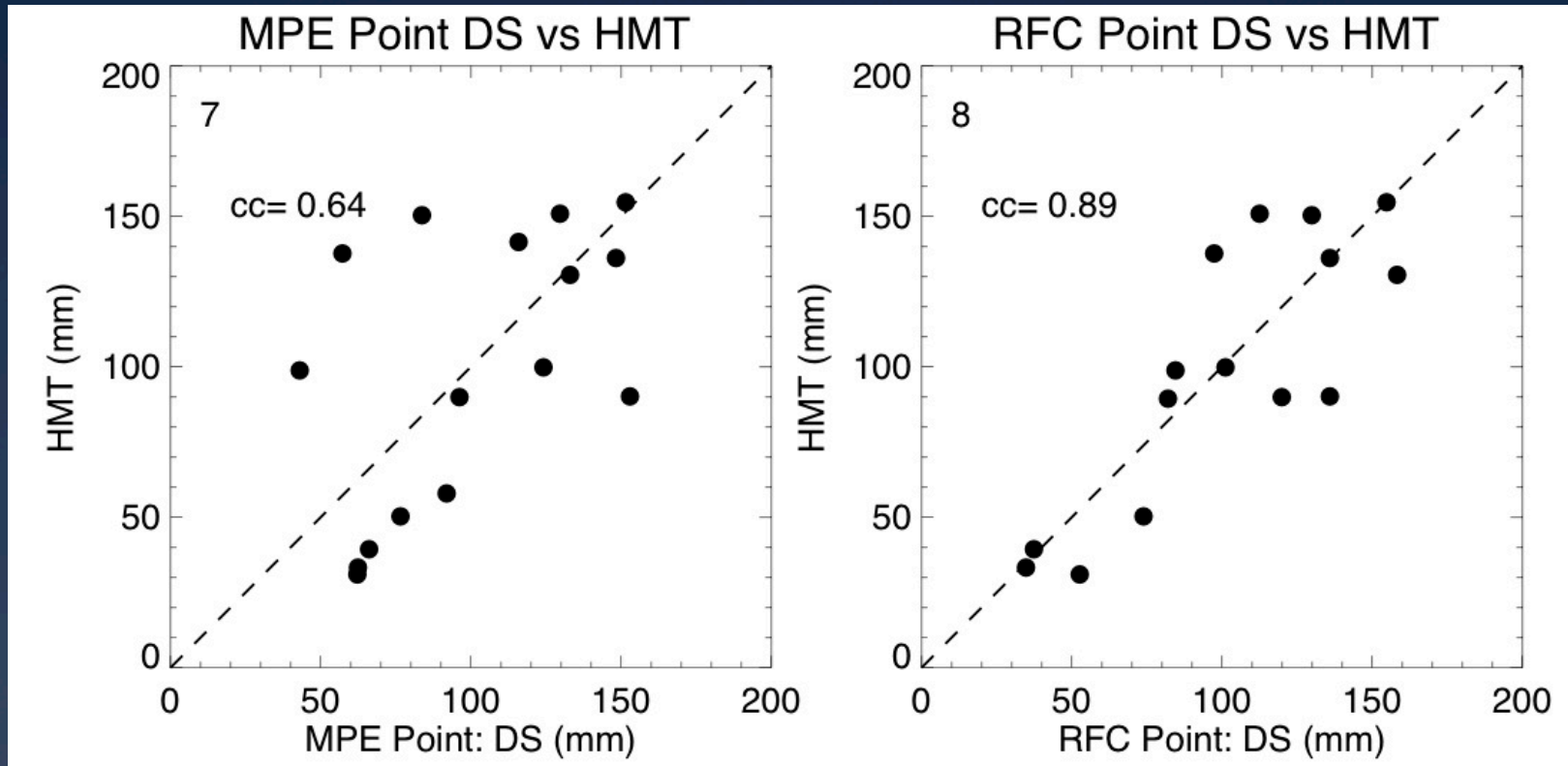


## RFC STG4 Storm Total



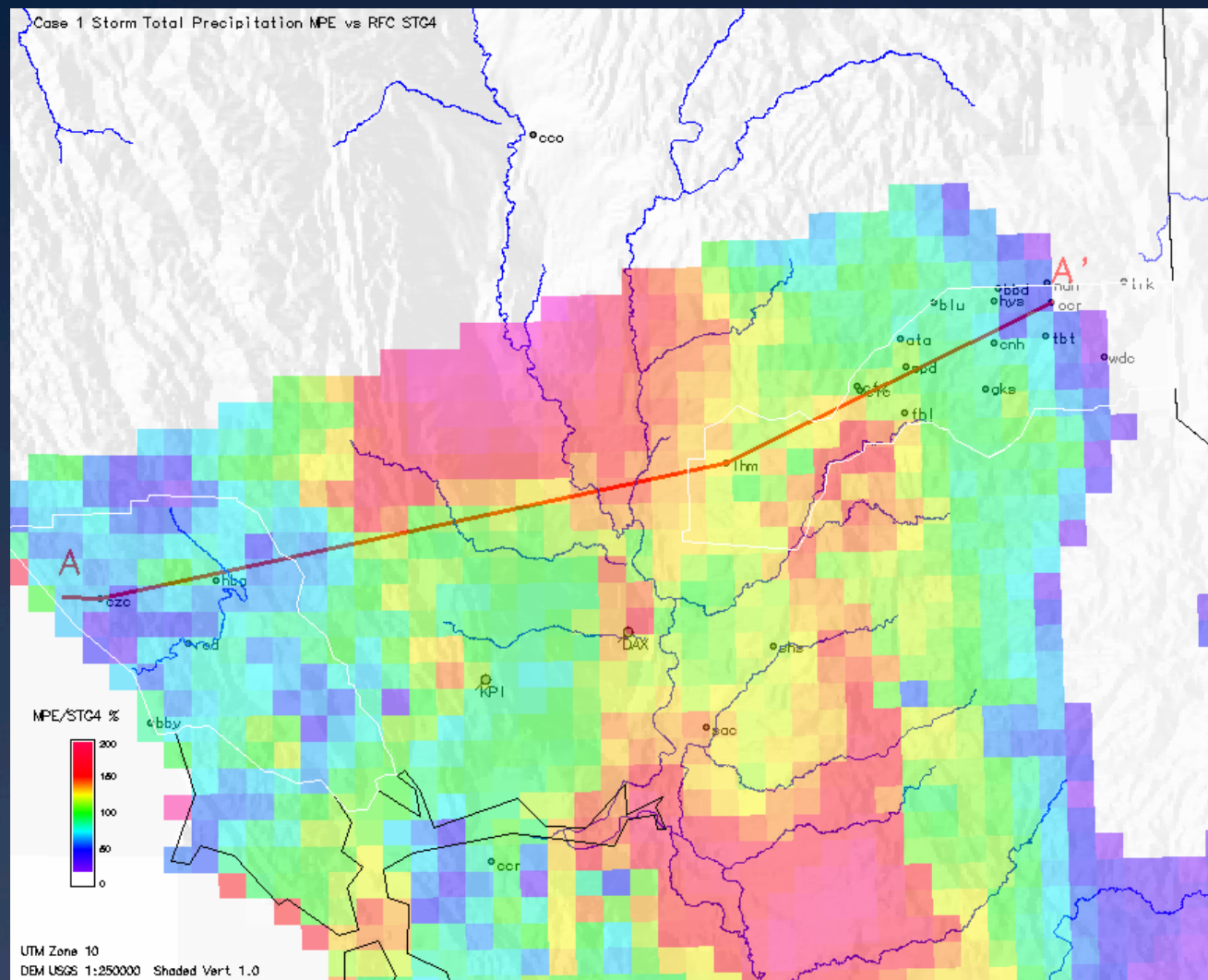


# Comparison of storm total QPE for all HMT gauges



- For this event, RFC does a better job for storm total precipitation

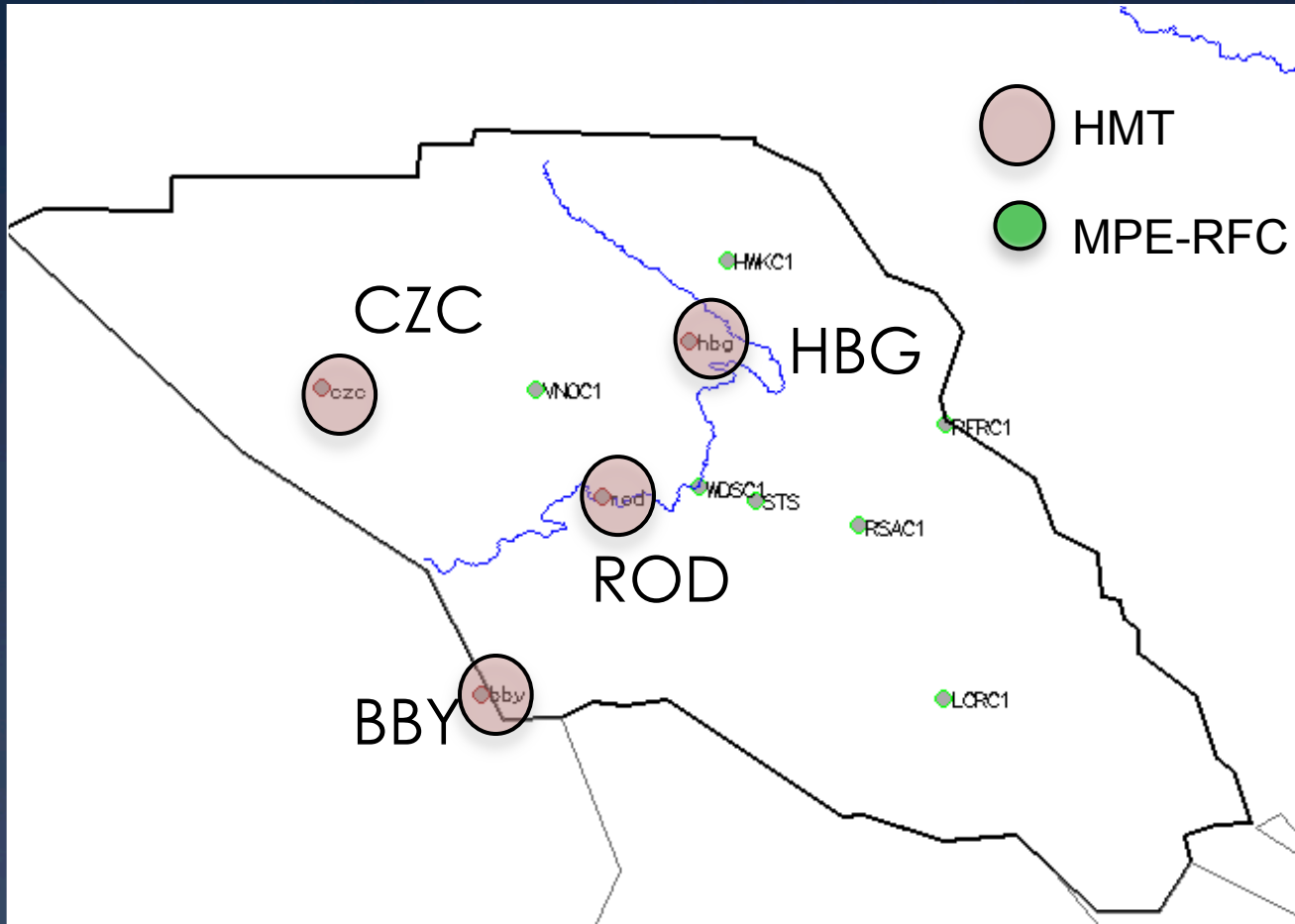
# Case 1 Storm Total PCP: MPE/Stage 4 MTR MPE N-DOMAIN



- Bias of MPE:RFC varies significantly across HMT network

# Sonoma County Comparison

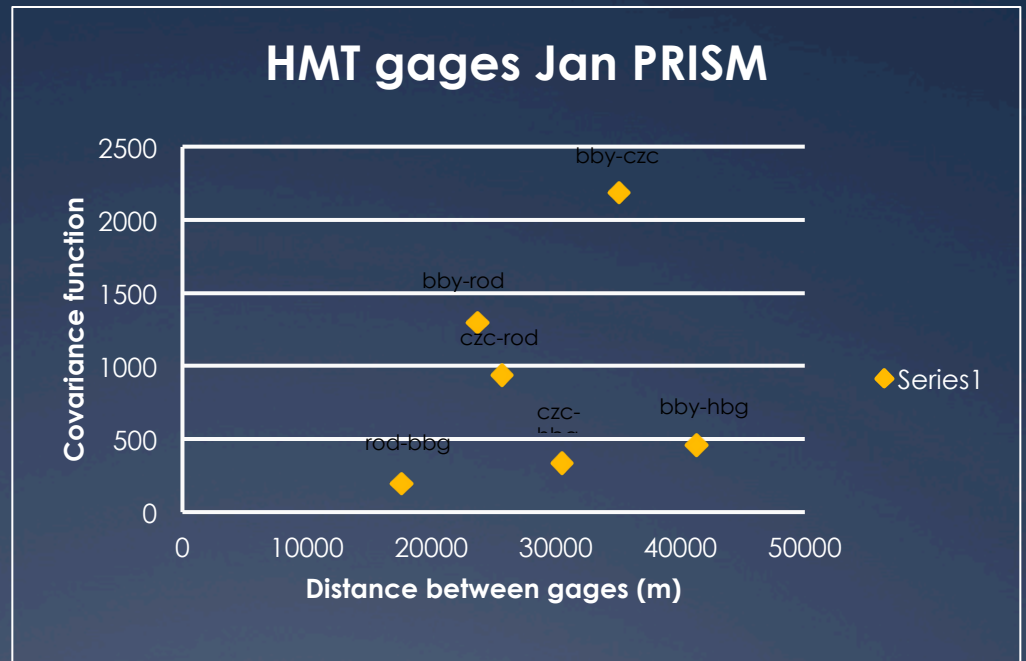
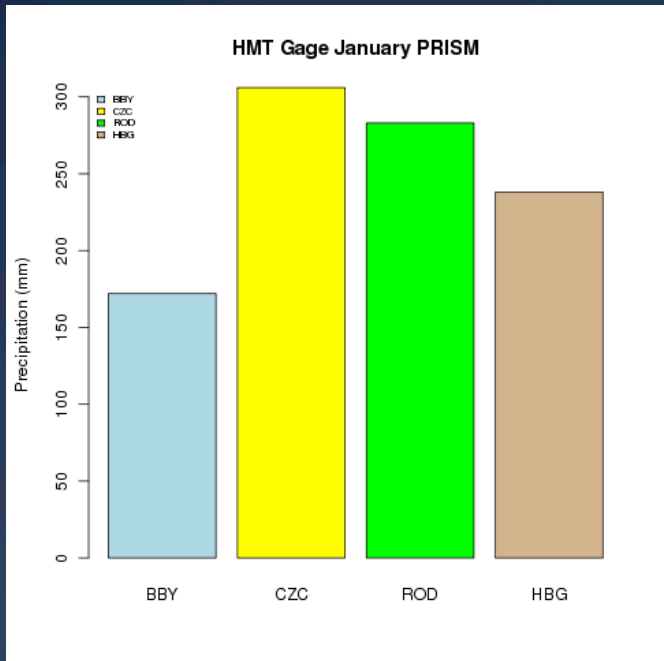
Gages used in RFC ST4 and MPE analysis - HMT gages not used.



- Evaluation of both point estimates and spatial gradients

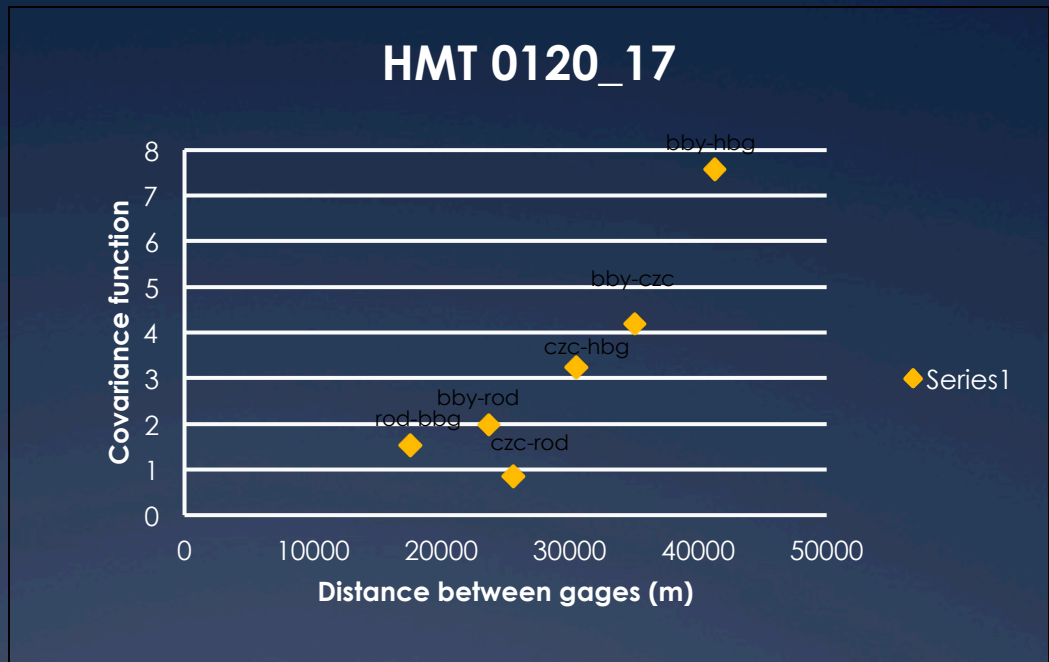
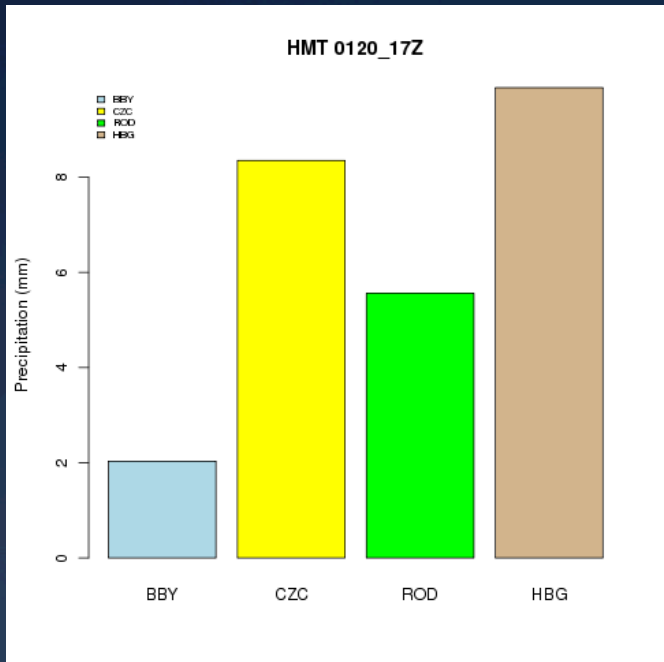
# How does HMT gage distribution and spatial distribution compare to climatology?

## HMT gage distribution January PRISM



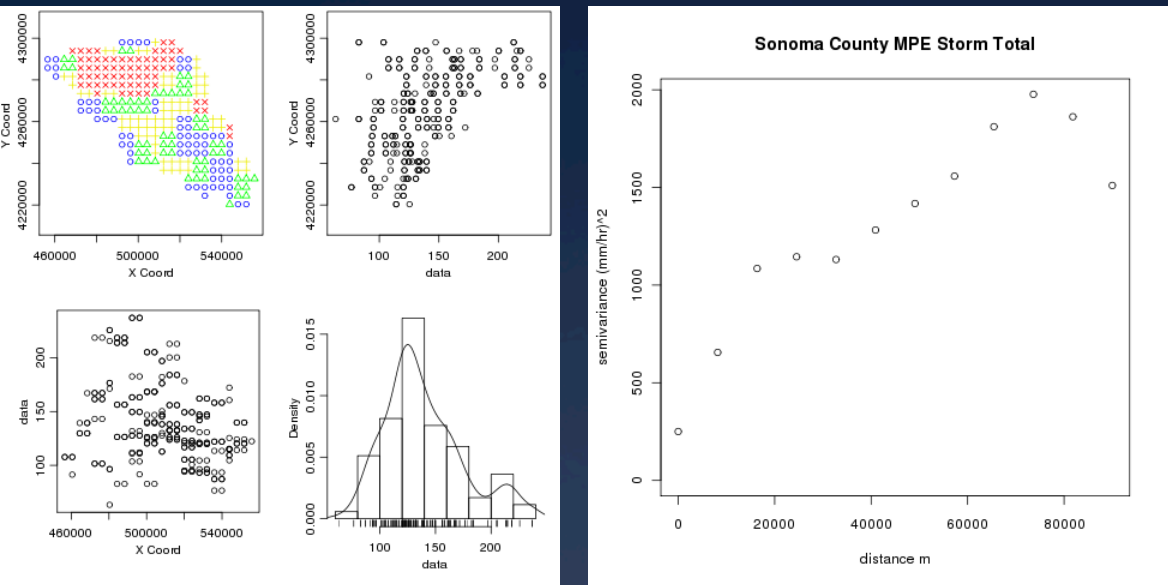
# Temporal and spatial variation of HMT gages

## Case 1: HMT gage 0120\_17

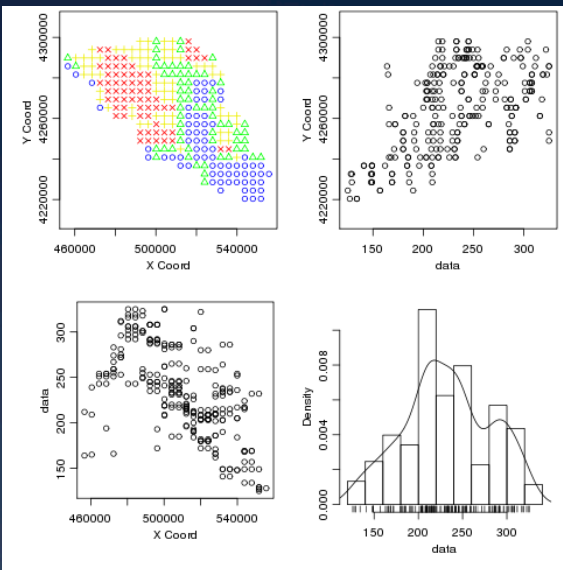


# Spatial Distribution Differences MPE vs ST4 vs PRISM

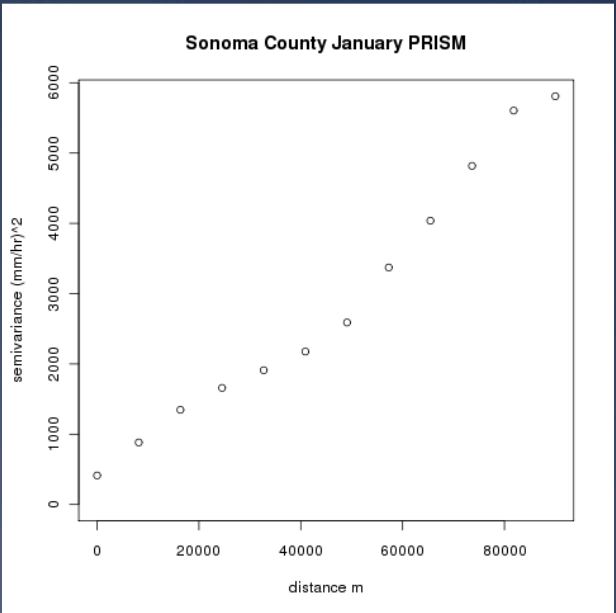
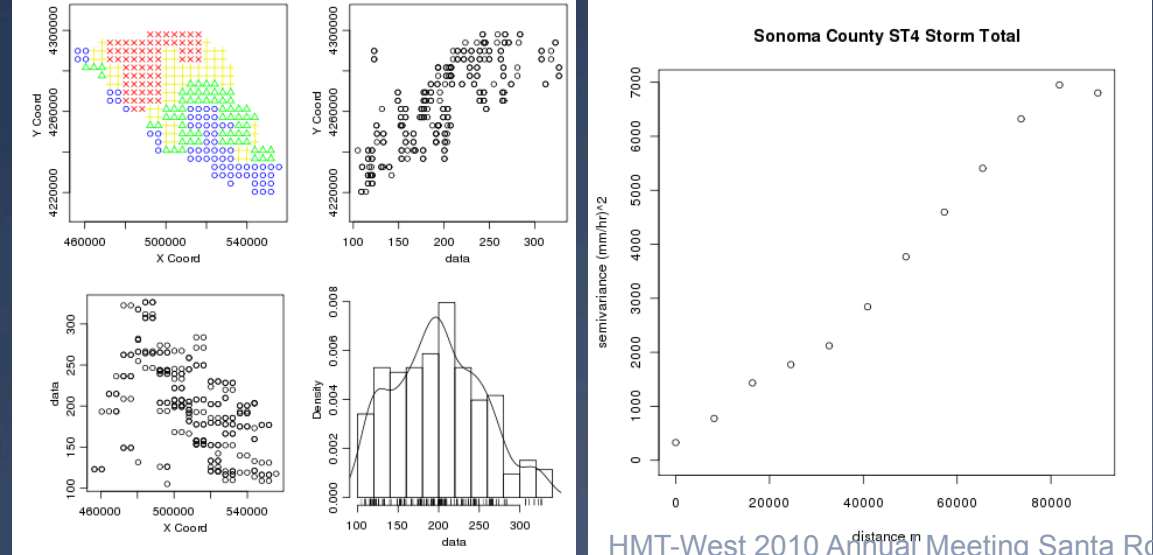
MPE Sonoma County distribution and variogram



Jan PRISM Climatology



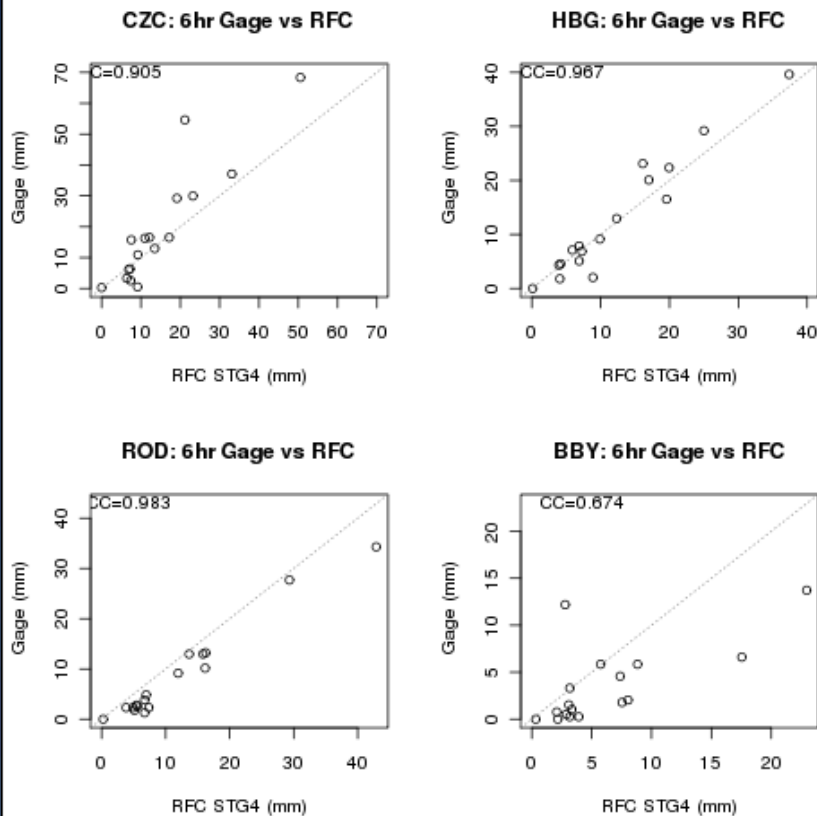
RFC ST4 Sonoma County distribution and variogram



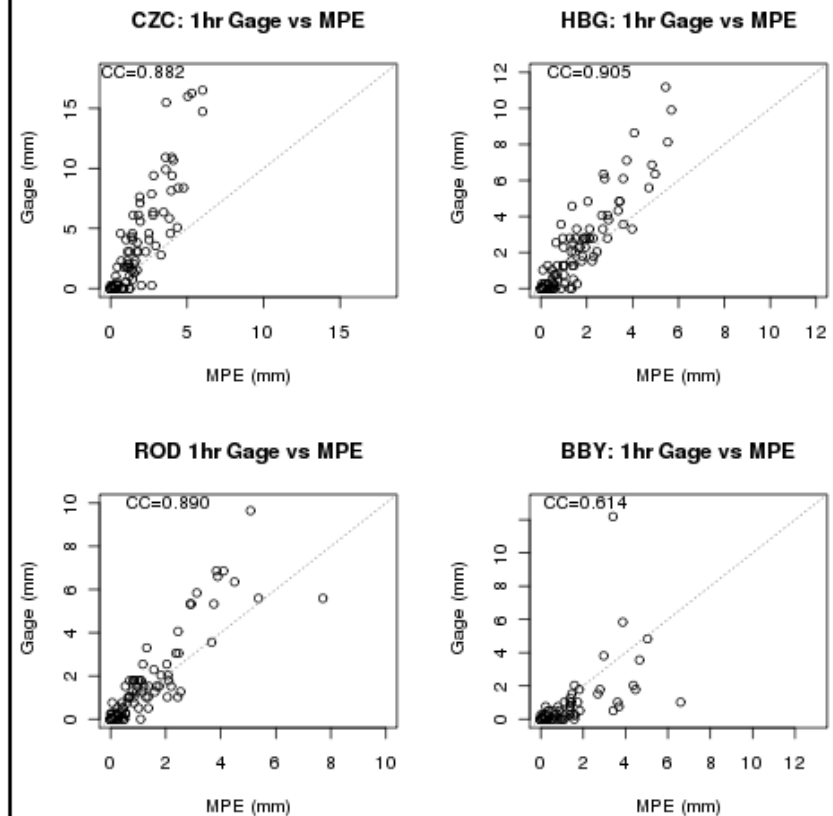


# Accuracy Assessment: Nearest Grid cell vs HMT Gage data Sonoma County Domain

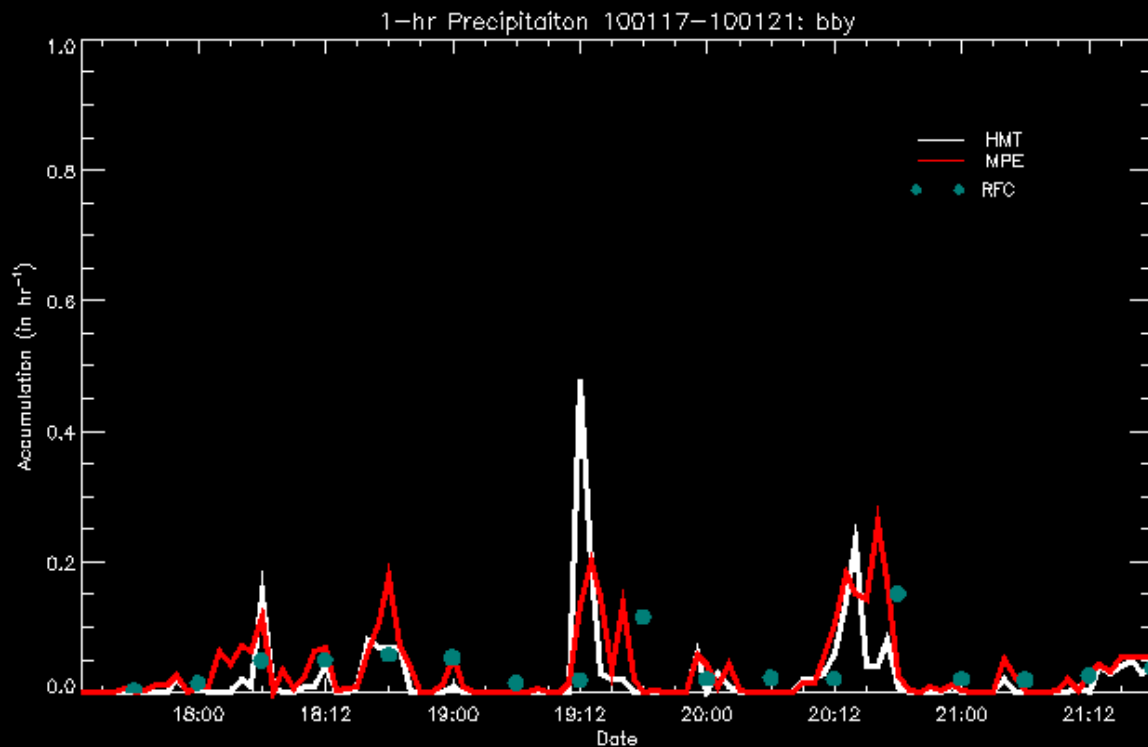
## HMT 6hr Gage vs 6hr RFC STG 4



## HMT 1hr Gage vs 1hr MTR MPE

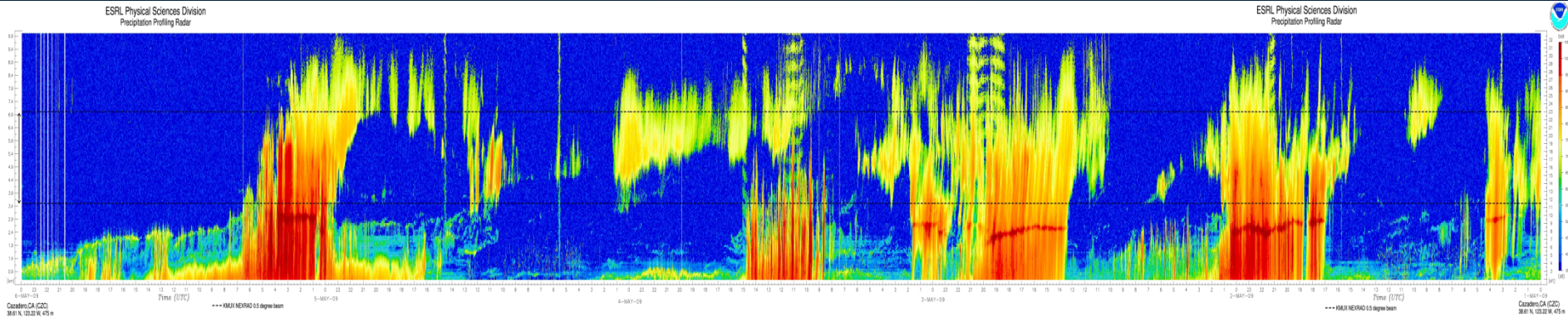


# 1-HR Precipitation Time Series: Bodega Bay (BBY)



- Agreement of MPE or RFC with HMT gauges varies significantly over time
- Examine additional HMT observing systems (profiling radars) to better understand causes of variability

# Cazadero (CZC) : time series of precipitation



Cazadero, CA Precipitation

